

REMARKS

Claims 1-5, 7-17 and 29 are now pending in the application. Claims 4 and 10 are amended to correct typographical errors. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendment and remarks contained herein.

1. CLAIM OBJECTIONS

Objection is made to claims 4 and 10 due to typographical errors. Claim 4 is amended to include "from" after "selected" and claim 10 is amended by inserting a space after "claim." Applicant respectfully requests withdrawal of the objections in view of these amendments.

2. REJECTION UNDER 35 U.S.C. § 103 – TANEMOTO IN VIEW OF KAUFMAN

Claims 1-5 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanemoto et al. (U.S. Pat. No. 6,395,416) in view of Kaufman (U.S. 5,445,904). This rejection is respectfully traversed.

Independent claim 1 is drawn to a fuel cell that includes an electrically conductive member adjacent the electrode, wherein the electrically conductive member comprises a metal plate having a major surface. The fuel cell also has a flow field comprising conductive particles dispersed in a binder, and the flow field is defined by lands patterned on the major surface of the metal plate of the electrically conductive member.

The combination of the Tanemoto and Kaufman references fails to establish a *prima facie* case of obviousness because the art gives no reason or motivation for a

skilled artisan to make the alleged combination or to modify the reference teachings. In the recent Supreme Court decision of *KSR Int'l. Co., v. Teleflex, Inc.* 550 U.S. ___, 2007 WL 1237837, at *14 (2007) the Court noted:

Often, it will be necessary . . . to look to interrelated teachings of multiple patents; the effects of demand known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an **apparent reason** to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit. (emphasis added)

In addition, the combination of Tanemoto and Kaufman fails to teach or suggest a flow field defined by lands patterned by conductive particles in a binder on the major surface of the metal plate of the electrically conductive member. Since these references do not teach or suggest all the claim limitations, the combination cannot render the present claims obvious. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The Tanemoto reference discloses a separator 101 having a collector portion 102 formed of electrically conductive filler and resin. Col. 5, lines 25-55. The mixture of electrically conductive filler and resin is injection molded to integrally mold the collector portion 102 having channels 104. The separator 101 is likened to the electrically conductive member of present claim 1. However, Tanemoto does not disclose an electrically conductive member that comprises a metal plate having a major surface in addition to a flow field comprising conductive particles dispersed in a binder. Consequently, the reference also does not teach a flow field defined by lands patterned by conductive particles dispersed in a binder on the major surface of the metal plate of the electrically conductive member.

Kaufmann is provided to account for the shortcomings of Tanemoto. The Kaufmann reference discloses a cell 10 formed of a plurality of layers in contact with each other. Kaufmann FIG. 1 and col. 3, line 37 to col. 4, line 16. An anode 14 layer is adjacent an electrolyte member 16 which is adjacent a cathode 18 layer. The next layer is an oxygen distribution plate 22, which has a plurality of grooves 28 in its surface that face the cathode 18. The subsequent layer is a bipolar separator plate 26 that is made of a thin layer of titanium 32 electroplated on both sides with layers 34, 36 of platinum. The Kaufmann reference, therefore, includes an oxygen distribution plate 22 with a plurality of cut grooves 28 on one face (towards the cathode) and a metal bipolar plate 26 with layers 34, 32, 36 on the other face. However, Kaufmann does not teach or disclose a flow field defined by lands patterned by conductive particles dispersed in a binder on the major surface of the metal plate of the electrically conductive member.

The combination of these two references, as proposed by the Office Action, involves utilization of the metal bipolar separator plate of Kaufmann within the fuel cell of Tanemoto. Office Action from February 26, 2007 pages 2-3. Placing the metal bipolar plate from Kaufmann into the fuel cell of Tanemoto still fails to include all the features of claim 1. Namely, there is no manner by which the combination can result in a flow field defined by lands patterned on the major surface of the metal plate of the electrically conductive member, as in present claim 1. The lands in Tanemoto are integral with the collector portion 102 of the separator 101 and the lands in Kaufmann are integral with the oxygen distribution plate 22 which is next to the bipolar plate 26. As such, using either the collector portion 102 from Tanemoto or even the oxygen distribution plate 22 from Kaufman in conjunction with the metal bipolar separator plate

26 from Kaufman would not result in a flow field defined by lands patterned on the major surface of the metal plate of the electrically conductive member. Consequently, claim 1 is not obvious as the combination fails to include all of the recited features.

Even if the metal bipolar plate from Kaufmann is somehow inserted within the Tanemoto fuel cell, however, this combination would not create a flow field comprising conductive particles dispersed in a binder defined by lands where the lands are patterned on the major surface of the metal plate of the electrically conductive member.

Moreover, there is no motivation provided by either reference, or in the art, for why a skilled artisan would make the alleged combination. Tanemoto is focused on designing a separator plate (i.e., a bipolar plate) having flow fields integrally formed each side of the plate portion. Tanemoto uses press or injection molding to form the collector portion from a composition including electrically conductive filler and resin binder. The collector portion 102 is framed by a manifold portion 103 having high mechanical strength that accommodates compression force. Tanemoto thereby solves problems in the art by producing a central collector 102 having high electrical conductivity, but low strength due to the amount of electrically conductive filler, which is protected by using a stronger and compressible manifold portion 103 around the outside of the collector portion 102. Tanemoto col. 5, line 25 to col. 6, line 3. Thus, Tanemoto provides a separator plate with integrated flow fields having high electrical conductivity that can easily be produced using press or injection molding. The Tanemoto reference, therefore, has already provided a solution to producing a highly conductive bipolar plate to easily and quickly transfer electricity. Furthermore, there is no issue in Tanemoto

regarding electricity transfer from the flow field lands to the plate portion of the collector because they are one in the same.

Kaufmann, on the other hand, is focused on making the oxygen distribution plate 22 hydrophilic by oxidizing carbon atoms on the surface so that water is wicked away. Kaufmann col. 2, line 65 et seq. Kaufman expressly notes that there is no preference for a metal plate versus other electrically conductive materials. Kaufmann's bipolar separator plate 26 just needs to be electrically conductive. In principle, any barrier which allows electronic conduction between gas distribution plates 22 and 24, while still isolating the oxygen and hydrogen gas from each other, can take the place of the metal bipolar separator plate 26. Kaufmann col. 7, lines 14-51.

Thus, no special property or advantage is attributed to use of the metal bipolar separator plate 26, it is simply conductive and any other conductive material can be substituted as long as it is gas impermeable. For example, in Kaufmann FIG. 3 a conductive thin plastic membrane 126 is used as a bipolar separator plate and substituted for the metal plate. Consequently, a skilled artisan would perceive no particular benefit in using the Kaufmann metal bipolar plate versus the Kaufmann plastic membrane as disclosed.

Applicant further notes that the patent laws draw a distinction between trade-offs and motivation to combine: trade-offs often concern what is feasible, not what is necessarily desirable, whereas motivation to combine requires the latter. See, e.g., *Winner International Royalty Corp. v. Wang*, 2002 F.3d 1340, 53 USPQ2d 1580 (Fed. Cir.), *cert. denied*, 530 U.S. 1238 (2000). Accordingly, the present claims are not

obvious as there is no distinction as to the desirability of the metal bipolar plate versus the conductive plastic membrane found in Kaufmann.

In sum, a skilled artisan viewing these two references would not be motivated to incorporate the metal bipolar plate over the conductive plastic membrane, as no benefit is cited for using one versus the other. Likewise, Tanemoto has already provided a solution for a highly conductive bipolar plate by including a high amount of electrically conductive filler in the collector 102 portion, and substitution of either the metallic or plastic Kaufmann bipolar plate would not have any perceived benefit. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)

Further, it is not clear how the metal bipolar separator plate of Kaufmann could be combined with the Tanemoto fuel cell. The Tanemoto flow field (incl. channels 104) and bipolar plate are integrated as a single unit, i.e., the collector portion 102 of the separator plate 101 is formed by press or injection molding. Thus, there is no bipolar plate in Tanemoto separate from the flow field that could therefore be swapped with the Kaufman metal bipolar separator plate 26. What is more, an advantage of press or injection molding of a mixed or kneaded matter is the ease and low cost at which the separator plate can be made. Tanemoto col. 2, lines 58-65. However, nothing in either reference provides any guidance to a skilled artisan on how to create such a construction, and such a construction would defeat the ease and low cost benefits, if it would even work at all.

As the Tanemoto flow field and bipolar plate are one in the same, it is not obvious as to how the Kaufmann metal bipolar plate can be included in the fuel cell. The proposed combination defeats the purpose of the Tanemoto reference and cannot therefore establish a prima facie case of obviousness. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959) (If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.) Moreover, simple insertion of the metal bipolar plate into the Tanemoto cell would actually result in two adjacent bipolar plates, both capable of conducting electricity, with one of the integral flow fields from the Tanemoto collector 102 between the separator 101 and the Kaufman metal bipolar plate. It is unclear based on these two references as to how such a fuel cell would function, if it would function at all, and the combination cannot thereby establish a case of obviousness. In any case, such a construction would be redundant and a skilled artisan would not be motivated to produce this combination. *McGinley v. Franklin Sports Inc.*, 262 F.3d 1339, 60 USPQ2d 1001, 1010 (Fed.Cir. 2001) ("If references taken in combination would produce a 'seemingly inoperative device,' we have held that such references teach away from the combination and thus cannot serve as predicates for a prima facie case of obviousness.").

Due to the several reasons outlined above, these references cannot render independent claim 1 and its dependent claims 2-5 and 14 obvious. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Applicant respectfully requests reconsideration of the claims and withdrawal of the rejection.

3. REMAINING REJECTIONS UNDER 35 U.S.C. § 103

Claims 7-9 and 15-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanemoto and Kaufman, together taken in view of Swathirajan et al. (U.S. 5,272,017). (Swathirajan) (New Rejection). This rejection is respectfully traversed.

Swathirajan is provided for teaching carbon cloth current collectors 30, 32. Swathirajan col. 3, lines 59-64; Figure 1. However, dependent claims 7-9 and 15-17 stem from independent claim 1, which includes a flow field defined by lands patterned by conductive particles in a binder on the major surface of the metal plate of the electrically conductive member. As the Swathirajan reference does not teach these features of claim 1, it cannot cure the deficiencies of Tanemoto and Kaufman described in the previous section. Accordingly, 7-9 and 15-17 are nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) (If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanemoto and Kaufman, taken together in view of Yamada et al. (U.S. 6,500,893). (Yamada) (New Rejection). This rejection is respectfully traversed.

Yamada is provided for teaching a resin composition for a fuel cell separator having amounts of resin and filler (graphite) that can be equal. Yamada col. 7, lines 63-67. However, dependent claim 10 stems from independent claim 1, which includes a

flow field defined by lands patterned by conductive particles in a binder on the major surface of the metal plate of the electrically conductive member. As the Yamada reference does not teach these features of claim 1, it cannot cure the deficiencies of Tanemoto and Kaufman described in the previous section. Accordingly, Claim 10 is nonobvious.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanemoto and Kaufman, together taken in view of Swathirajan and McManus et al. (U.S. 2003/0198857). (McManus) (New Rejection). This rejection is respectfully traversed.

Swathirajan is provided as described above. McManus is provided for teaching lands of the separator being of varying heights. McManus FIGS. 5 and 6. However, dependent claims 11-14 stem from independent claim 1, which includes a flow field defined by lands patterned by conductive particles in a binder on the major surface of the metal plate of the electrically conductive member. As neither the Swathirajan or McManus references teach these features of claim 1, they cannot cure the deficiencies of Tanemoto and Kaufman described in the previous section. Accordingly, Claims 11-14 are nonobvious.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanemoto and Kaufman, together taken in view of Fuss et al. (U.S. 2005/0095494). (Fuss) (New Rejection). This rejection is respectfully traversed.

Fuss is provided for teaching a striped-shaped pattern of electrochemically active regions where alternating electrochemically active regions include variable catalyst loadings. Fuss FIG. 9; paragraph [0039] et seq. However, dependent claim 29 stems

from independent claim 1, which includes a flow field defined by lands patterned by conductive particles in a binder on the major surface of the metal plate of the electrically conductive member. As the Fuss reference does not teach these features of claim 1, it cannot cure the deficiencies of Tanemoto and Kaufman described in the previous section. Accordingly, 7-9 and 15-17 are nonobvious.

Reconsideration of the claims and withdrawal of the rejections are respectfully requested.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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